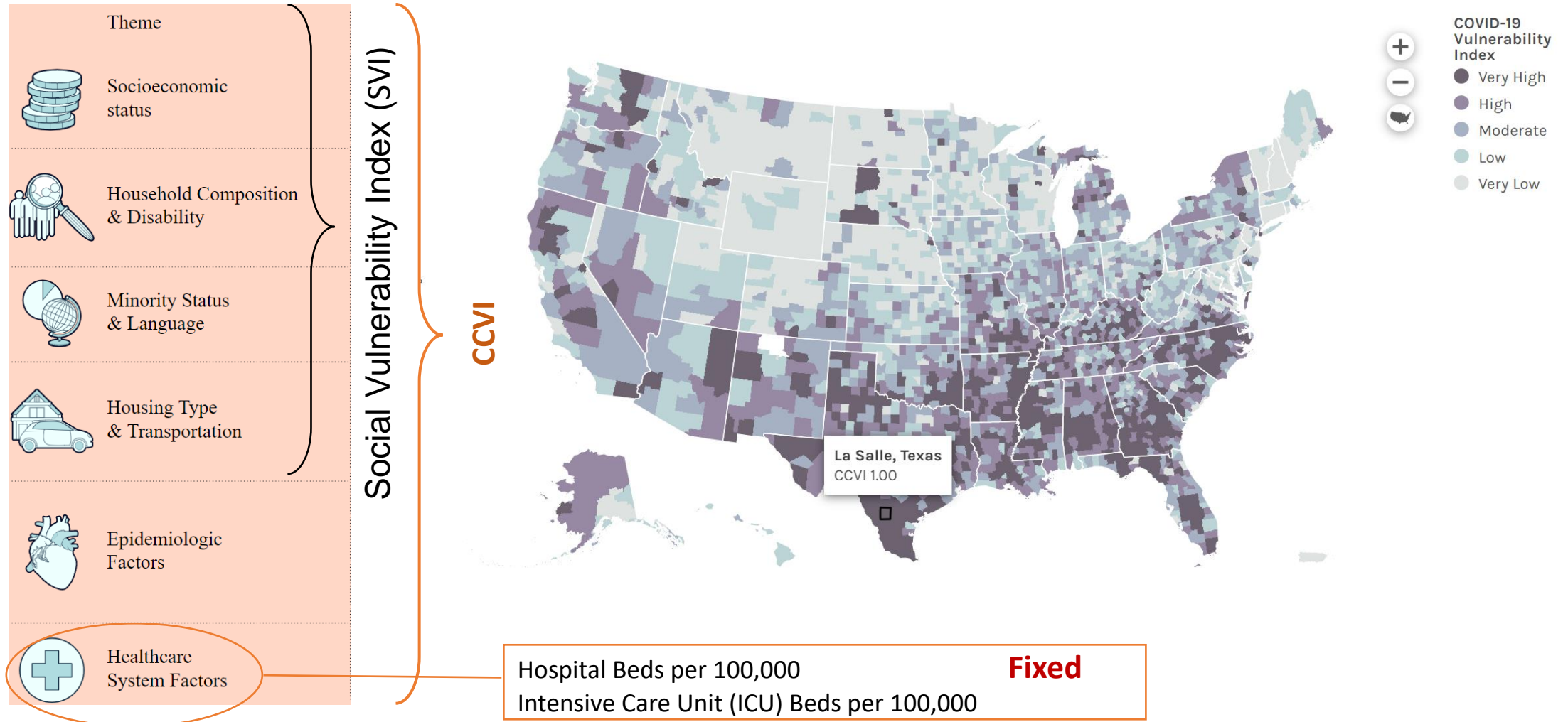


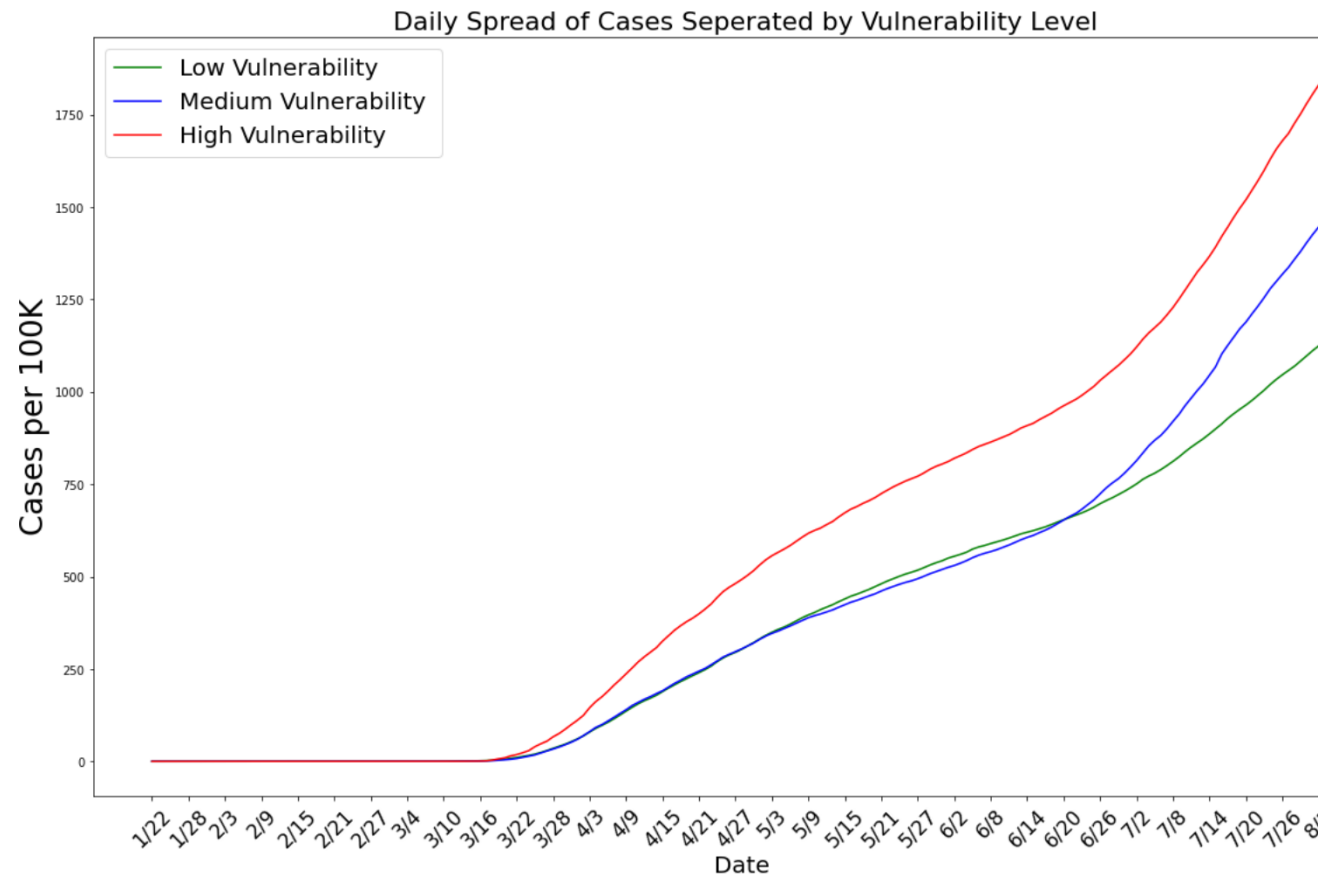
Dynamic COVID Community Vulnerability Index(DCCVI) and Hospital Utilization Forecast

Ashkan Farahani

Static COVID Community Vulnerability Index (CCVI) at the county level



Spread of Cases at Vulnerable Level



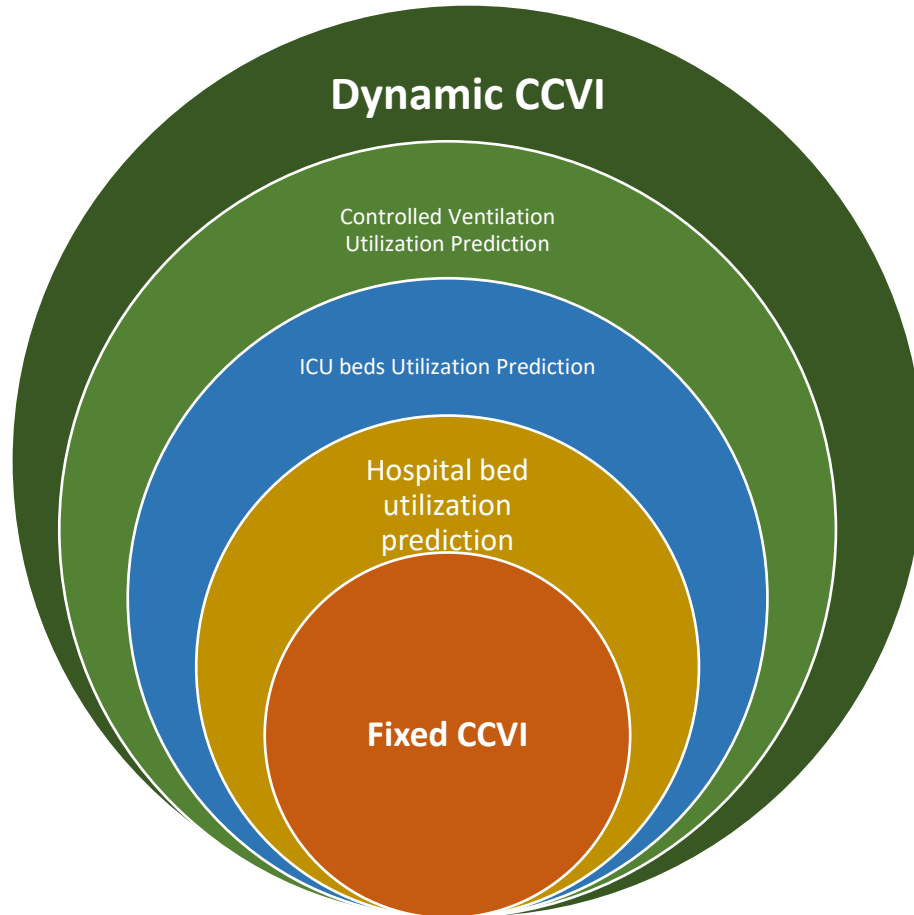
- Cases are growing faster in vulnerable highly vulnerable counties
- Vulnerable counties are more likely short on health system capacity

Solution:

Forecasting Health system capacity for the next 4 weeks

- Hospital bed utilization
- ICU beds Utilization
- Controlled Ventilation Utilization

Data Product: Dynamic CCVI

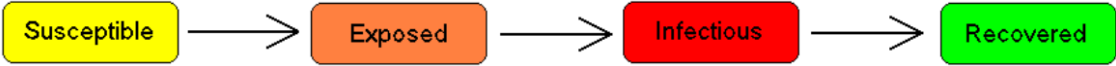


End User

Health System Decision Makers at County Level

Approach

Cases Prediction

- Compartment Epidemic Models 
- Different Versions are developed for COVID and established by CDC for competition
- Machine Learning Approach: **Multi-model Ensemble approach** out of available models

Hospitalization Prediction

- **Baseline hospitalization utilization** for non-COVID patients
- Use **demographic** and **epidemiological** factors to predict hospitalization

Input Data Resources

Cases Prediction

- [Modeling Groups](#) identified by CDC forecast tracking
- *Johns Hopkins Coronavirus Resource Center*

Hospitalization Prediction

- [USA Hospital Beds - Definitive Healthcare](#)
- [The Agency for Healthcare Research and Quality \(AHRQ\)](#)
- ICU beds - Kaiser Health News, Centers for Medicare, & Medicaid Services (CMS)
- [The COVID TRACKING PROJECT – COVID HOSPITALIZATION DATA](#)
- [Hospitalization Surveillance Network \(COVID-NET\) by CDC](#)
- [Change Healthcare - 2020 COVID-19 Claims](#)
- [Gallup poll](#) – Adults Divided on Status of COVID-19 Situation

Hospital Capacity

Current COVID Hospitalization

Demographic and epidemiological risk factors in COVID hospitalization

How Dynamic CCVI is different?

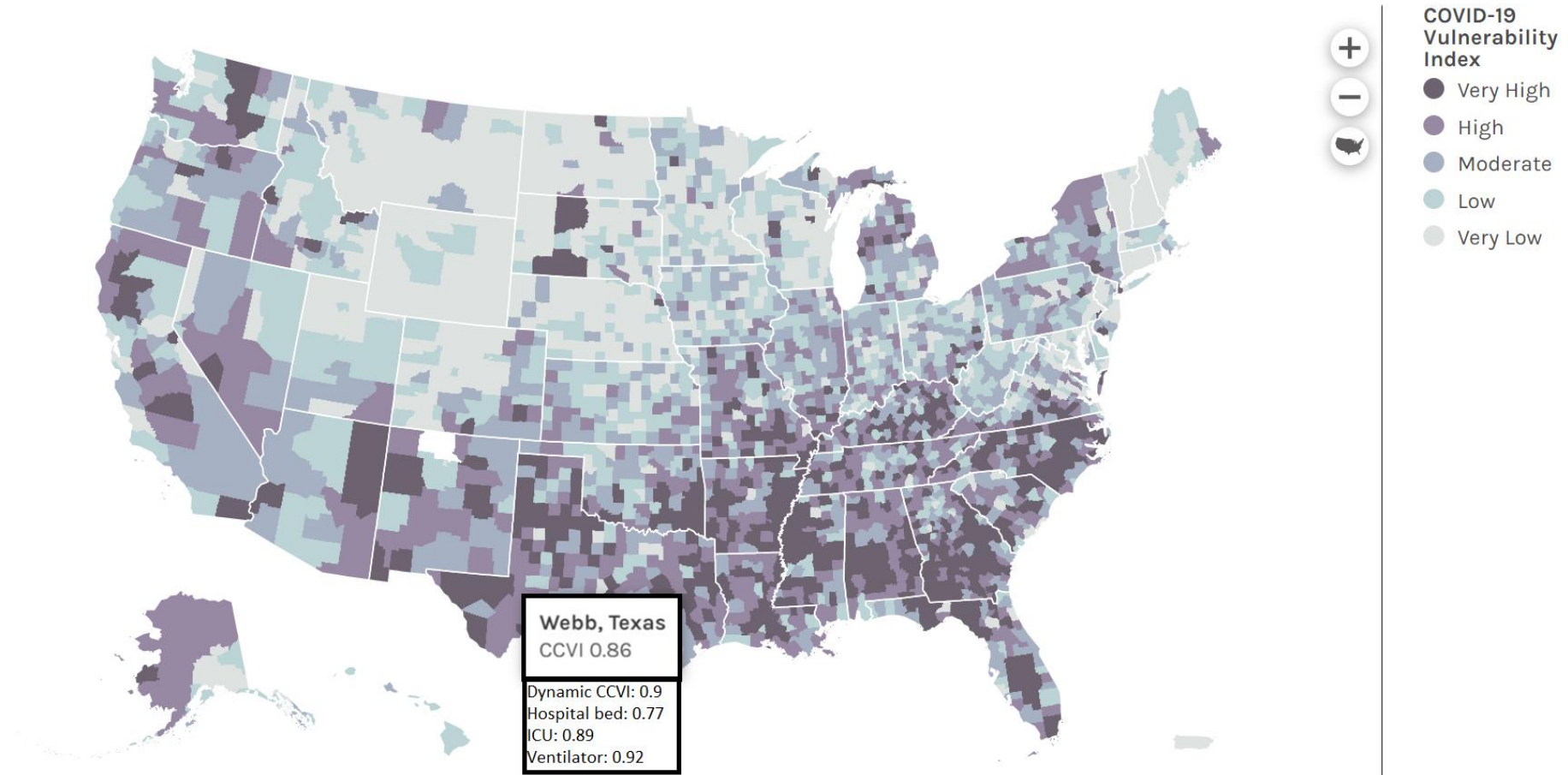
Cases Prediction

- Single epidemiology models suffer faster with their assumptions
- Use of Multi-model Ensemble approach can provide a more consistent prediction under different scenarios

Hospitalization Prediction

- Do not assume fixed hospitalization rate out of new cases
- Use of epidemiological risk factors (e.g. Age, health conditions – immune-compromised) for more accurate estimation of the kind and rate of hospitalization rate in each county.

Dynamic CCVI Dashboard



Questions?